

LETTERS TO THE EDITOR.

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Sunset Glows at Honolulu.

THERE has just been at Honolulu a reappearance of the phenomenon of sunset glows like those so familiar in 1883-84. It was first noticed after sundown of July 13. It seemed somewhat brighter on the 14th and 15th. After this it declined in intensity, but could be distinguished until the 20th.

A space of 15° radius around the sun was occupied by a whitish glow like that in "Bishop's ring." The outer coloured ring seemed to be entirely wanting.

We have no cable, and no foreign mail has arrived since the 6th. By a mail due to-morrow, we hope to hear of a probable cause to which this remarkable appearance may be due.

I note the following differences between these sunset glows and those of 1883-84. These are very much less bright than those; possibly equal to what those became after one year's continuance. Perhaps the most notable difference is the appearance of a tertiary glow after the primary and secondary. This consisted of a delicate rosy flush occupying a large tract of sky above the western horizon, from the altitude of 10° to that of 45° , and about 60° horizontally. This shaded off into purple at the edges against our clear blue Hawaiian sky. I think this the most exquisite and lovely tint I have ever seen in the sky, comparable only to that of some perfect jewel.

The larger stars were visible at the time of this tertiary glow. It continued for only a very few minutes each evening. A faint purple tint extended along the horizon quite to the south. This third glow failed to gather down upon the horizon like those preceding it.

Another marked peculiarity is the much earlier time at which the primary and secondary take place. The primary glow gathers soon after the sun is down, and makes its display while the sky is still bright. So it fails to be very effective as a show, although casting upon the western sky broad streaming radiations of glowing surface.

The secondary glow promptly follows and makes the chief display. It differs from the secondary Krakat   glow in the earlier time when it takes place, being nearly finished before any stars are visible. The Krakat   secondary lingered until after full darkness, settling down into a low blood-red stratum simulating the reflection of a remote conflagration. That peculiar simulation was entirely absent from the late appearances. Both at its close and throughout its course this secondary glow substantially resembles the primary glows as seen in 1884. It especially resembles the latter in presenting a well-defined and serrated upper edge bordered by dark sky. That, however, had small and numerous serrations, apparently due to cumuli upon a very remote horizon. The serrations of this, on the contrary, are large and broad, the interspaces being apparently the inverted shadows of cloud-masses upon a somewhat near horizon.

It seems evident that the reflecting stratum of haze in the late appearances was very low down as compared with the Krakat   haze. Hence the rapid succession of the glows. The reflected rays of the sun, traversing a much smaller extent of the lower atmosphere, show less red, having less of the other colours intercepted. For the same reason, they retain force enough for a third reflection, in which a very pure though faint red appears.

Honolulu, July 25.

SERENA E. BISHOP.

Globular Lightning.

THE following account of a display of globular lightning will, I think, be of interest to your readers, as it was well observed by several independent observers, and differs in some respects from those previously recorded. It is greatly to be wished that this phenomenon could have its place assigned to it in electrical theory.

On Monday, the 5th instant, at midday, this district was visited by a violent storm of rain, which lasted half an hour, and was accompanied by thunder and lightning. When the storm had passed over and the sky was getting bright, a rod-like object was seen to descend from the sky. It is described as being of a pale yellow colour, like hot iron, and apparently about 15 inches

long by 5 inches across. These dimensions are given by an observer who estimated its distance (about correctly, as it subsequently appeared) at 100 yards, and are not therefore affected by the uncertainty attaching to estimates of the sizes of objects whose distance is quite unknown. This object descended "moderately slowly," "not too fast to be followed by the eye" and quite vertically.

On reaching a point about 40 feet from the ground, and in close proximity with a chimney-stack belonging to a house in Twickenham Park, the object seemed to "flash out horizontally as if it burst," showing an intensely white light in the centre and a rosy red towards the outer parts. At the same instant a violent explosion was heard, and soon afterwards a strong smell was perceived, which is described by the observers as "resembling that of burning sulphur," for which the smell of ozone and nitric oxide might easily be mistaken.

Ordinary lightning is frequently most capricious in its action. In this respect this globular flash was in nowise behind.

I examined the outside of the chimney stack carefully, but no external effect whatever was visible. Inside, however, remarkable effects were produced, and I quote the following:—

"The back rooms consist of (1) basement kitchen; (2) ground floor dining-room; (3) first and second floor bed-rooms, and at the top a half attic. A stack of chimneys runs up the whole, and projects about 6 feet above the roof. There are no chimney-pots. No one was in any of the rooms except the kitchen, in which the servants were, and in which a fire was burning.

"The explosion filled the kitchen with smoke and soot. The dining-room also was filled with smoke and soot, though no fire was burning in it.

"The master of the house was just coming into the dining-room from the conservatory when he heard the detonation and simultaneously saw a bright flash of light. He staggered back a moment, and then ran through the smoke and soot to the hall, and called out to know if anyone was hurt. Finding all safe he returned into the dining-room. A Japanese umbrella set open as an ornament in the empty grate, but not fixed in any way, was undisturbed, though the hub of it was hot to the touch. Piles of soot spread out in a semicircle to the centres of the side walls of the room, and an arm-chair, which had been standing close to the fire-place, was 6 feet from its previous position, and had evidently been turned round and thrust against the wall. In the bed-room, on the first floor, soot was on the floor and in the fire-place. The slab of marble forming the architrave under the mantel-shelf, and extending the whole width of the fire-place, had been thrust out from its setting, and was, with a number of bricks, lying 6 feet away on the floor. The mantel-shelf and pier-glass were undisturbed. In the second-floor bed-room, soot and mortar were in the fire-place and on the floor; one end of the grate was broken and a piece of the detached cast iron (some 3 inches square) was lying against the wall 6 feet to the right. In the attic bed-room, mortar reduced to the condition of fine silver sand was lying in the fire-place and on the floor; the wash-stand, which stood against the fire-place, was pushed some 2 or 3 feet towards the centre of the room, but not overturned; and the carpet was rumpled up. There is in this room a bell on the wall opposite the fire-place, and a helical check-spring passes from this bell to an attachment in the wall. At this point of attachment a piece of plaster of the size of one's hand had been detached from the wall, and was found near the fire-place, 18 feet off at the other end of the room."

At this time, when electrical theory is receiving so much attention, the views of a theorist such as Dr. Lodge would, I think, be of great interest on the subject of these rare discharges. To all appearance a detached portion of something—is it atmospheric, or ethereal?—is carried along bodily through the air, bearing with it a very considerable potential energy, and at the same time radiating light. At an instant determined, perhaps, by its proximity to the chimney-stack, its constraint is suddenly relieved, and a discharge like ordinary lightning seems to occur between it and the earth, *vid* (as it seems) the heated air of the chimney. Has anyone an explanation for this?

A. T. HARE.

Neston Lodge, East Twickenham, August 24.

On some Effects of Lightning.

I CAN fully corroborate Mr. A. F. Griffith's account of the remarkable way in which two trees in a wood near St. Albans

have been broken in two, and rent to splinters, by lightning. The first tree which he mentions, however, suggests very forcibly that the "explosion" must have occurred at the core of the tree, for long wedge-like splinters of the wood have been forced outwards, and are now projecting from the stem. The fact, also, that the whole of the bark was in each case torn off, and projected in every direction round about the trees, can be accounted for only by an impulse proceeding from the middle of the stem southwards. One feature of the case which Mr. Griffith did not mention is the twisting which seems to have occurred with the second tree: the portion which is nearly broken off appeared to have been twisted through about 90° , and the portion of the stem which is left standing is also considerably twisted in the same direction; as to the stem, however, it is difficult to estimate how much of the twisting may be due to the growth of the tree.

That any part of the effects are due to wind, is, I think, quite out of the question. It is indeed a curious sight to see two sound oak-trees, some 6 or 8 feet in circumference at their base, broken off, twisted, and torn to splinters, as if they had been so much matchwood; but one of the most remarkable features of the case appears to me to be, that there are *two* trees which have been treated in almost exactly the same manner. If it were the effect of one shock, that shock must have divided itself into nearly equal portions, and must have struck two trees which are some 30 yards apart, which do not stand in any isolated position, and which are separated from each other by several other trees, all of which remained untouched. On the other hand, it is quite inconceivable that two shocks of such an exceptional character should have occurred within a few yards of the same spot, and should have produced identical effects of such an extraordinary character.

The case is one which certainly deserves investigation.

Harpenden, August 18.

SPENCER PICKERING.

Some Lake Ontario Temperatures.

THERE are, among the great lakes of the St. Lawrence, exceptional opportunities for observing the effect of heat and cold upon large bodies of fresh water. The vast area and depth of the lakes, the different latitudes in which they lie, and the extremes of heat and cold of the Canadian seasons, all combine to render observations of interest.

It thus far appears that, in their main expanse, Lake Superior and the Georgian Bay (the eastern basin of Lake Huron) constitute, in midsummer, great bodies of colder water—the former registering at the surface as low as $39\frac{1}{2}^\circ$ F. (Hind), and the latter at 10 fathoms indicating 45° F., and, at the bottom, even lower than $39\frac{1}{2}^\circ$ F. (Boulton). On the other hand, the lower lakes, including Ontario, are shallower than Superior, lie in warmer latitudes, have some affluent streams from even farther south, and may be said to have perceptible, though light, currents through them. The temperatures of their waters are thus very different from those of Lake Superior and the Georgian Bay. Thus, on May 6 of this year, at 4.15 p.m., Commander Boulton, R.N., found the surface of the water off Griffiths Island, in the Georgian Bay, 35° F., and the bottom, at 60 fathoms, $35\frac{1}{2}^\circ$ F.; whilst on May 23, at 11 a.m., near the outlet of Lake Ontario—my first soundings there—I found the air (the day being calm and cloudy) 55° F., the surface-water $52\frac{1}{4}^\circ$ F., and the bottom at 13 fathoms $50\frac{1}{4}^\circ$ F., and this was after a cool and exceptionally windy spring.

Some general results, which seem warranted by very numerous thermometer-readings near Kingston, may be of interest. The north-east end of Lake Ontario here does not usually exceed 20 fathoms in depth, but through it flow into the St. Lawrence all the waters of the great lakes.

Areas of Water of Different Temperatures.—At the surface the water is not uniform in temperature, even at points relatively near each other, and which appear to have the same conditions—the variations being generally from 1° to 3° . At different depths down to the bottom there are equally marked variations. In the tributary streams similar results appear. In a shallow creek fully exposed for an eighth of a mile to the sun's rays, and slowly flowing over a succession of limestone ledges, the mercury, in $1\frac{1}{2}$ inch of water on a warm June afternoon, could be seen rising and falling between 81° and 83° F. Here there were exceptional causes, but in the line of outflow from the lake to the St. Lawrence the fluctuations are to be ascribed rather to the great evaporation at the surface, and the cooler waters beneath ascending to supply the place of the evaporated water.

As the evaporation would be irregular, varying with the passing clouds, and the gusts of wind, the ascending currents would also be irregular. These ascending waters would give rise to an inflow at the bottom from the deeper and cooler parts of the lake to take their place, and both these currents would be affected by the general light onward flow of the lake waters towards the entrance of the St. Lawrence.

Gradual Absorption of Heat.—The general rise in the temperature of the Lake Ontario waters as the summer advances is at first slow compared with the general rise in the temperature of the air, but as midsummer is reached, the rise is more rapid both at the surface and at the bottom. A comparison with temperatures from Lake Erie will, eventually, better explain this. The circumstance, however, has its bearing on the well-known modifying effect of great bodies of water on the climate of the immediately surrounding land. In illustration of it, on June 14, at noon, when the air indicated $79\frac{3}{4}^\circ$ F., the surface water in the main channel—2 miles from Kingston—was still as low as $57\frac{1}{2}^\circ$ F., or only 5° higher than on May 23. On July 5, the readings in the same place had increased to $69\frac{1}{2}^\circ$ F., with the air at 79° F., and on July 10 to $74\frac{3}{4}^\circ$ F., with the air at $92\frac{3}{4}^\circ$ F., the thermometer always being in the sun. The most marked change was between June 25 and July 5, when the advance registered was 9° . The bottom temperatures indicate somewhat similar results. On May 23 at 13 fathoms the deep sea thermometer registered $50\frac{1}{4}^\circ$ F.; on June 14 at 12 fathoms, 52° F.; on July 10 at 17 fathoms, 53° F.; and on July 25 at 12 fathoms, 67° F.

The absorption and retention of the sun's heat is, however, most noticeable in the small streams and quiet pools. There we find well illustrated the general proposition that in high temperatures the surface of comparatively still water, where unaffected by deep under currents, absorbs and retains the heat of the sun to a much greater degree than the immediately overlying air. A marked example of this was observed in the shallow lightly flowing stream already referred to, where on June 14 at 3.15 p.m. the air at 3 feet above the water indicated a slight breeze 73° F., and at the surface 76° , whilst the water at $1\frac{1}{2}$ inch registered 83° F., at 4 inches varied between $79\frac{1}{2}^\circ$ and $82\frac{1}{2}^\circ$, and at 7 inches on the bottom fell to $72\frac{1}{2}^\circ$ F. The records of other creeks did not indicate such extremes, but showed that each stream in its current, bottom, and surroundings, may have circumstances which vary the temperature. In very shallow, still pools, exposed freely to the sun and breeze, the difference between the air and water surface temperatures is even more marked, the water on sunny afternoons in June and July showing about 11° higher range. In such shallow, still pools, however, the water, though indicating some variation, is tolerably uniform in temperature, even to the bottom.

Effect of Channel Currents.—Near Rockport, among the Thousand Islands, there is a broad and deep channel where the current down the river runs at about 2 miles an hour. Here at 37 fathoms, in different localities, the deep sea thermometer gave the same readings as the surface thermometer, showing that the water was completely churned up.

Another illustration was in the Gananoqui River immediately below the falls. The temperature at the bottom here on June 10 was $62\frac{3}{4}^\circ$ F.; a quarter of a mile down stream at the outlet to the St. Lawrence, it was $61\frac{1}{2}^\circ$ F.; in the St. Lawrence, 150 yards off the outlet, 57° F.; and 200 yards further up the St. Lawrence, $54\frac{1}{2}^\circ$ F.; the surface water at each of these points varying only between $62\frac{1}{2}^\circ$ and 63° F. These records show how the deeper and colder waters of the St. Lawrence gradually asserted themselves on coming into contact with the Gananoqui River waters.

A. T. DRUMMOND.

The Yahgan.

THE tribe in Tierra del Fuego described by the Rev. C. Aspinall are called the Yahgan (Jahgan being a German form and not the English). The missionaries have translated the Gospels into Yahgan with some interpolations of special English terms. There are two or three other distinct languages for the scanty population. It can be seen that the Yahgan is a language of Old World roots, and words can be recognized that philologists determine to be typical Aryan roots. The variety of languages is a fact noticeable among small exogamous communities, and it is a matter of interest to find such variety at the extremity of the New World.

H. C.